Notes on the Biology and Larval Morphology of *Stenodynerus canus canus*

(Hymenoptera: Eumenidae)

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Stenodynerus canus canus R. Bohart is a small wasp about 8–9.5 mm long and has been recorded from northwestern United States (Idaho, Washington, Oregon, Nevada, Utah, Wyoming, Montana, Colorado) and British Columbia (Bohart, 1966). The present paper includes some fragmentary information on the biology of this species and a description of the larva.

Markin and Gittins (1967) reviewed the biological information on the North American species of *Stenodynerus*. Since their publication, Krombein (1967) and Evans (1970) have added biological information on the group.

Six nests of *S. c. canus* were discovered during summer 1971 at a site (2,395 meters) about 0.6 km west of West Thumb, Yellowstone National Park, Wyoming. Nests were separated from each other by at least 0.3 m but were all found in an area of about 2.5 × 6 m.

Natural crevices within a few volcanic outcroppings housed the nests. The narrow linear crevices ranged from 4–7 mm in width and 1–7 cm in length. Although there appeared to be no preference for crevices which faced a particular direction, wasps all selected crevices which were more or less on a horizontal plane. Each nest entrance was surmounted by a curved mud turret 10–12 mm long and 3.5 mm wide (Fig. 1).

Personal communication with R. M. Bohart and a review of the literature reveal that this is the first reported instance of a species of *Stenodynerus* using natural crevices of rocks for nest sites (Fig. 1). Other species construct turrets but all known species which do so nest in the ground.

Three female wasps were observed in the act of constructing their turrets, two on 3 July and one on 15 August. Each wasp spent a few seconds searching for a dirt particle before transporting it in the mandibles a few centimeters to the nest. The mandibles, legs, and the tip of the abdomen were used to incorporate the dry particles into and around the edge of the turret openings. The female wasps apparently mixed small quantities of water with the dry particles as they were added. Fin-

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FIG. 1. Upper left.—A partially constructed turret of *Stenodynerus canus canus* protruding from a narrow linear crevice. Upper right.—A section of rock showing the placement of cells and one prepupa in situ.

ished turrets angled upwards 20–40° before curving so that the openings faced downwards.

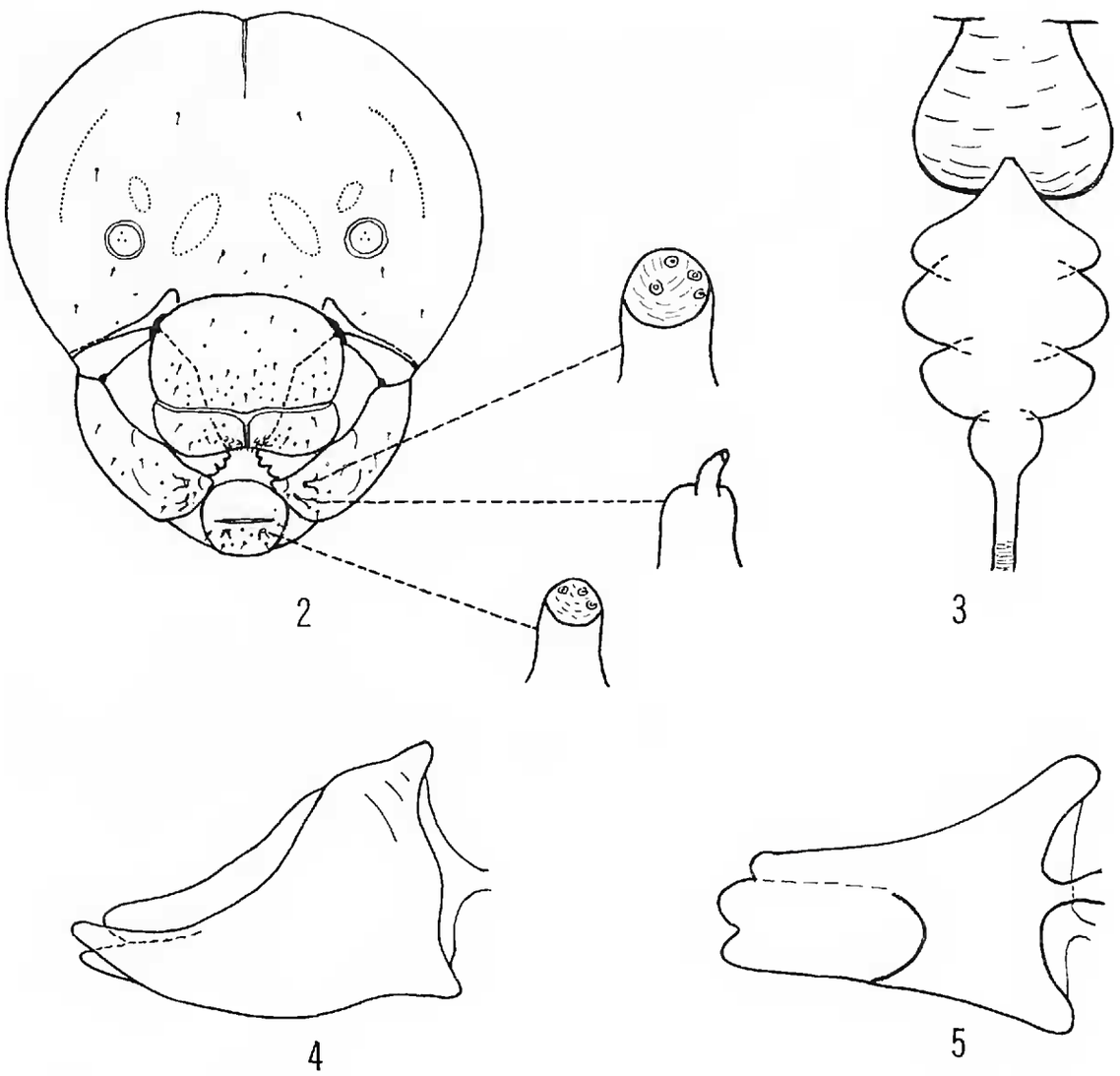
One of the wasps observed on 3 July took about two hours to add 5 mm to the length of her turret. The wasp observed on 15 August was adding material to her partially constructed turret at 11:15 a.m. (RMDT). At this time the turret measured 4.5 mm in length. Approximately four hours later this wasp had finished the turret, which measured 10 mm. Up to two minutes was spent by each wasp adding a single particle to the turret.

Nests were excavated on 26 June, 3 July, 10 July, and 28 August. Two completed nests found on 26 June produced one and two cells respectively. A completed nest with four cells was found on 3 July. These three nests all yielded prepupae. Two nests excavated on 10 July each produced a completed inner cell with a feeding larva and a partially provisioned outer cell. The 28 August nest contained a prepupa, inner cell; a late feeding larva; and an outer cell being actively provisioned.

The length of a crevice may influence the number of cells constructed by a wasp within it. The completed nest with four cells was housed in a crevice 7 cm long while the other five nests were found in shorter crevices.

Widths of each of 11 completed cells coincided with the varying tunnel widths of the crevices. Four cells provisioned in a crevice with a diameter ranging from 5.5 mm to 7 mm had corresponding widths. The shorter lengths of these four cells ranged from 4–5 mm. The other cells varied from 6–7.5 mm in length and 3.5–5 mm in width.

Eggs are apparently laid before provisioning of the cell commences. An unhatched egg was found at the base of each of the three partially



FIGS. 2–5. Prepupa of *Stenodynerus canus canus*. FIG. 2. Head capsule, frontal view. FIG. 3. Spiracle, optical section. FIG. 4. Right mandible, ventral view. FIG. 5. Right mandible, inner view.

provisioned cells examined. Most reports on the biology of the genus *Stenodynerus* mention the attachment of eggs by slender filaments to cellular walls. I did not observe this characteristic in this study but future observations of *S. c. canus* nests may reveal such egg attachments. My excavations through the rocks housing the nests damaged two of the observed eggs and in so doing, destroyed any evidence of egg attachments. The third egg could easily have been loosened from a suspended position during the course of my digging. Subsequent development of this one viable egg in a gelatin capsule failed.

Prey of this wasp consisted of small caterpillars of the families Gelechiidae and Gracilariidae, although only one larva of the latter family was found in a cell. The number of caterpillars found in the partially provisioned cells were one, four, and eleven.

After provisioning, the cell is sealed with a mud partition about 0.5 mm thick. The cap of the outer-most cell of two of the completed nests was flush with the base of the mud turret. The completed nest with four cells had a vestibular cell about 3 cm long. A separate mud cap about 0.5 mm thick plugged this nest at the base of the turret. The provisioned cells examined were flush with one another. Summer rains partially destroyed completed turrets and in so doing, separately plugged completed nests.

Postdefecating larvae line their cells with a thin layer of silk before entering the prepupal stage. On 3 July two prepupae were transferred from their cells to gelatin capsules. These were subsequently kept at room temperature. Later in the laboratory, a male emerged on 23 November and a female on 3 December. The pupal stage of both lasted about 12 days.

Grandi (1937) figured and described the larva of *Ancistrocerus parietum* (Linnaeus) (as *Odynerus*), a species introduced to northeastern United States and Canada from the Palaearctic. It appears, however, that to date no larvae of eumenids endemic to North America have been described.

Larvae of *S. c. canus* (Figs. 2–5) conform to the main characters used by Reid (1942) to separate eumenid larvae from other vespoid larvae. The width of the labrum in this species is as great as the width of the clypeus where the two join, and secondly, the distance from the antenna to the nearest mandible is less than the distance from the midpoint on the anterior margin of the labrum to a line drawn between the bases of the mandibles. Prepupae of *S. c. canus* also exhibit a median groove dividing the labrum into two lateral lobes and a membranous area between the anterior margin of the clypeus and the posterior margin of the labrum (Fig. 2). Both of these characters are mentioned by Reid as constituting additional eumenid characters but expressed in varying degrees of constancy within the group. The following description employs, in part, the terminology and organization used by Torchio (1970) in his larval descriptions of two species of the family Masaridae.

Prepupa.—Head: Integument sclerotized; mandibular apices and articulation, maxillary and labial palpi, salivary lips, and anterior tentorial pits heavily pigmented; antennae, posterior tentorial pits, pleurostomal and hypostomal thickenings, and posterior thickening of head capsule lightly pigmented; head capsule and mouthparts with few small setae and scattered sensoria; epicranial suture distinct, incomplete, terminating well above clypeus; parietal bands narrow, feebly developed; antennae located low on head, each with three sensoria, pair of small moderately deep pits positioned above antennae; pair of larger shallow indentations on frons above epistomal suture; epistomal suture well developed, indi-

cated by slightly arched line between anterior tentorial pits; clypeus moderately protuberant with sensoria more numerous on lower half; labroclypeal suture distinct, indicated by narrow membranous area between anterior border of clypeus and posterior margin of labrum; labrum divided by heavily pigmented, median sulcus into two lateral lobes, distal margin strongly emarginate and minutely spinulate centrally; mandibles robust, sclerotized, apices tridentate, inner apical surface concave and limited basally by transverse carina; maxillae distinct, galea and palpi subapical and conspicuous, palpi with four sensoria; labium with prementum and postmentum distinct, palpi subapical and conspicuous, each with three sensoria; salivary opening transverse with sclerotized lips projecting slightly above prementum. *Body*: Slightly bent anteriorly, head not touching any abdominal sternum; 6.5–8 mm long; intersegmental lines complete, fairly conspicuous; dorsolateral tubercles slightly elevated; spiracles not elevated above body, peritreme present, atrium slightly sclerotized, lacking spines or ridges, primary tracheal opening with narrow collar, without spines, subatrium expanded with diameter equal to that of atrium, posteriorly constricted into primary trachea; anus transverse slit approximately at midline.

No parasites or other insects were associated with the six nests, although one nest was found adjacent to the nest of a bee, *Dianthidium heterulkei heterulkei* Schwarz.

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